REMARKS

This Preliminary Amendment corrects a typographical error in the claim of benefit of the above-referenced application. In the original claim of benefit, the filing date of application 60/314,580 was specified as 8/23/2000. This Amendment corrects the filing date for this application to 8/23/2001.

Respectfully submitted,

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Cont. A3

solutions that specify one route for each net. In other embodiments, solving the LP problem returns real-numbered solutions. In some of these embodiments, the method converts the real-number solutions into integer solutions that specify one route for each net.--

IN THE CLAIMS

Please cancel claims 1-26.

Please add the following claims 27-52.

--27. A method of routing nets within a particular region of a design layout, each net having a set of pins, the method comprising:

a) partitioning the design region into a first set of sub-regions;

b) for each particular net, identifying a set of routes, wherein each route in the route set identified for a particular net traverses a set of sub-regions containing the particular net's pins, wherein each route includes a set of route edges, and each route edge connects two sub-regions;

c) formulating a linear-programming ("LP") problem based on the identified routes; and

d) solving the LP problem to identify one route for each net.

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28. The method of claim 27 wherein formulating an LP problem includes using the identified routes to specify an objective function to optimize.

29. The method of claim 28, wherein the objective function includes a component for the overall length of the routes for the nets, and solving the LP problem includes searching for a solution to the objective function that reduces the overall-length component.

30. The method of claim 28, wherein the objective function includes a component for the expected number of vias for the routes for the nets, and solving the LP problem includes searching for a solution to the objective function that minimizes the via-number component.

31. The method of claim 28, wherein a plurality of paths exist between the sub-regions, wherein a plurality of the paths are diagonal paths, wherein the routes are defined with respect to the paths between the sub-regions.

32. The method of claim 31, wherein

the objective function includes a congestion-component that quantifies the congestion of the paths, and

solving the LP problem includes:

measuring the congestion of the paths for each solution considered by the objective function;

a4

identifying a solution that reduces the congestion of the paths.

33. The method of claim 31, wherein formulating an LP problem includes specifying a congestion constraint regarding the congestion of the paths between the sub-regions.

34. The method of claim 31, wherein some of the paths share common regions with other paths, wherein formulating an LP problem includes specifying that the capacity of common regions be properly shared among the paths.

35. The method of claim 28, wherein a plurality of inter-sub-region edges exist between the sub-regions, wherein a plurality of the inter-sub-region edges are diagonal, wherein the routes are defined with respect to the inter-sub-region edges.

36. The method of claim 35, wherein

the objective function includes a congestion-component that quantifies the congestion of the inter-sub-region edges, and

solving the LP problem includes:

measuring the congestion of the inter-sub-region edges for each solution considered by the objective function;

identifying a solution that reduces the congestion of the inter-sub-region edges.

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37. The method of claim 35, wherein formulating an LP problem includes specifying a congestion constraint regarding the congestion of the inter-sub-region edges between the sub-regions.

38. The method of claim 35, wherein some of the inter-sub-region edges share common regions with other inter-sub-region edges, wherein formulating an LP problem includes specifying that the capacity of the common regions be properly shared among the inter-sub-region edges.

39. The method of claim 27, wherein formulating an LP problem includes specifying at least one congestion constraint.

40. The method of claim 39 wherein specifying at least one constraint includes requiring that only one route be selected for each net.

41. The method of claim 40, wherein the formulated LP problem is an integer-linear-programming ("ILP") problem, and the solving of the ILP problem returns integer solutions that specify one route for each net;

42. The method of claim 40,

wherein the solving of the LP problem includes searching through sets of real-number solutions for each net, wherein each set of real-number solutions for a particular net specifies a real-number value for each route in the set of routes for the particular net,

a4

wherein requiring that only one route be selected for each particular net includes specifying that the sum of the real-number value in each set of real-number values equals 1.

43. A computer readable medium comprising a computer program having executable code, the computer program for routing a net within a particular region of a design layout, the net having a plurality of pins, the computer program comprising:

a) a first set of instructions for partitioning the design region into a first set of sub-regions;

b) a second set of instructions for identifying, for each particular net, a set of routes, wherein each route in the route set identified for a particular net traverses a set of sub-regions containing the particular net's pins, wherein each route includes a set of route edges, and each route edge connects two sub-regions;

c) a third set of instructions formulating a linear-programming ("LP") problem based on the identified routes; and

d) a fourth set of instructions solving the LP problem to identify one route for each net.

44. The computer readable medium of claim 43 wherein the third set of instructions includes a fifth set of instructions for using the identified routes to specify an objective function to optimize.

45. The computer readable medium of claim 44, wherein a plurality of paths exist between the sub-regions, wherein a plurality of the paths are diagonal paths, wherein the routes are defined with respect to the paths between the sub-regions.

46. The computer readable medium of claim 45, wherein

the objective function includes a congestion-component that quantifies the congestion of the paths, and

the fourth set of functions includes:

a sixth set of instructions for measuring the congestion of the paths for each solution considered by the objective function;

a seventh set of instructions for identifying a solution that reduces the congestion of the paths.

47. The computer readable medium of claim 45, wherein the third set of instructions further includes a sixth set of instructions for specifying a congestion constraint regarding the congestion of the paths between the sub-regions.

48. The computer readable medium of claim 45, wherein some of the paths share common regions with other paths, wherein the third set of instructions further includes a sixth set of instructions for specifying that the capacity of common regions be properly shared among the paths.

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49. The computer readable medium of claim 44, wherein a plurality of inter-sub-region edges exist between the sub-regions, wherein a plurality of the inter-sub-region edges are diagonal, wherein the routes are defined with respect to the inter-sub-region edges.

50. The computer readable medium of claim 49, wherein

the objective function includes a congestion-component that quantifies the congestion of the inter-sub-region edges, and

the fourth set of instructions includes

a sixth set of instruction for measuring the congestion of the inter-sub-region edges for each solution considered by the objective function;

a seventh set of instructions for identifying a solution that reduces the congestion of the inter-sub-region edges.

51. The computer readable medium of claim 49, wherein the third set of instructions includes a sixth set of instructions for specifying a congestion constraint regarding the congestion of the inter-sub-region edges between the sub-regions.

52. The computer readable medium of claim 49, wherein some of the inter-sub-region edges share common regions with other inter-sub-region edges, wherein the third set of instructions further includes a sixth set of instructions for specifying that the capacity of the common regions be properly shared among the inter-sub-region edges.--

IN THE ABSTRACT

On page 175, lines 1-8, please delete the "Abstract of the Invention", and insert therein a new Abstract of the Invention as follows:

--ABSTRACT OF THE INVENTION

Some embodiments provide an LP method that identifies routes. In some embodiments, this method is used by a router that defines routes for nets within a region of a design layout. Each net has a set of pins in the region. The method partitions the region into a set of sub-regions. For each particular net, the method identifies a set of route. Each route for a net traverses the sub-regions that contain the net's pins. Each route includes a set of route edge, and each route edge connects two sub-regions. Also, some of the identified routes have route edges that are at least partially diagonal. The method formulates a linear-programming ("LP") problem based on the identified sets of routes for the nets. The method then solves the LP problem to identify one route for each net. In some embodiments, the formulated LP problem is an integer-linear-programming ("ILP") problem, and solving the ILP problem returns integer solutions that specify one route for each net. In other embodiments, solving the LP problem returns real-numbered solutions. In some of these embodiments, the method converts the real-number solutions into integer solutions that specify one route for each net.--